



## **From responsibility to accountability: Electricity market mechanisms accomodating probabilistic offers**

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From responsibility to accountability: Electricity market mechanisms accomodating probabilistic offers

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Large scale integration of stochastic renewable sources of energy (mainly wind and solar power) over the recent years has brought important economic and environmental benefits with many countries adopting favorable regulatory frameworks to further promote their development. Such sources of energy are usually non-dispatchable and partly predictable, so support mechanisms were put in place in order to safeguard stochastic producers against price volatility. However, as their stakes increase, electricity markets over-relying on support mechanisms also increase losses in social welfare by transferring imbalance costs to consumers. This calls for a novel approach in the design of electricity markets whereby those responsible for such imbalances will be also accountable.

In this paper, we propose a shift from the current paradigm of treating stochastic producers similarly to the conventional ones. We argue that the producers' offers should be probabilistic, instead of deterministic, so that they reflect the stochastic nature of production and design a market mechanism to accommodate such offers. The mechanism allocates uncertainty risk proportionally to the stochastic producers, while we analytically prove that revenues are equal to a linear transformation of a strictly proper scoring rule. This shows that the mechanism elicits accurate and precise forecasts. Finally, a Monte Carlo simulation of the clearing of a simple power system serves as an illustrative example and proof of concept.